REMARKS

The Office Action mailed August 1, 2008 has been carefully reviewed and the foregoing amendment and following remarks have been made in consequence thereof.

Claims 1-8 are now pending in this application. Claims 1-8 stand rejected.

The rejection of Claims 1, 3-5, and 7-8 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 7,106,891 to Wyman (hereinafter referred to as "Wyman") in view of the article titled "Spatial Size Distributions: Applications to Shape and Texture Analysis" published on pages 1430-1442 of the December 2001 issue of IEEE (herein after referred to as "Ayala") is respectfully traversed.

Wyman describes a method and system for determining convergence when registering image sets. A computed tomography (CT) image set (110) and a magnetic resonance image (MRI) image set (105) are received (410) by an Enhanced Image Registration System (EIRS) (120). EIRS (120) compares (420) the two image sets by using mutual information and performs (425) multiple transformation iterations on CT image set (110) to align it with MRI image set (105). EIRS (120) then determines (430 and 440) when image sets (110 and 105) are sufficiently aligned using convergence techniques. Image sets (110 and 105) are considered to be aligned when the magnitude of the transformation has converged as determined by comparing a convergence value to a predetermined threshold (t). More specifically, EIRS (120) determines (430) the magnitude of the transformations performed by examining specific points within CT image set (110) after each transformation. When the change in magnitude between succeeding transformations is below predetermined threshold (t), EIRS (120) determines (440) that the magnitude of transformation has converged. Aligned image sets (110 and 105) are output (450) from EIRS (120) to generate a transformed CT image set (125) that is aligned with MRI image set (105). Notably, Wyman does not describe or suggest adapting a reference image and a plurality of images for a granulometric analysis. Moreover, Wyman does not describe or suggest obtaining a pattern spectrum of the reference image from the granulometric analysis or checking for a similarity between the pattern spectrum and each of the plurality of images. Further, Wyman does not describe or suggest extracting a plurality of candidate images that are similar to the reference image from the plurality of images based on the granulometric analysis.

4

Ayala describes a method of analyzing shapes and textures within images. Granulometric analysis is combined with the comparison of an original image and its granulometric transformation to classify texture. Ayala describes that granulometry and granulometric size distributions are used to define probability distributions for binary and gray-scale images. Notably, Ayala does not describe or suggest extracting a plurality of candidate images that are similar to a reference image from a plurality of images based on the granulometric analysis. Moreover, Ayala does not describe or suggest calculating mutual information shared by each of the transformed candidate images and the reference image. Further, Ayala does not describe or suggest selecting a candidate image, which shares a largest amount of mutual information with the reference image, from among the plurality of transformed candidate images.

Claim 1 recites an image processing method, the method comprising: "adapting a reference image and a plurality of images for a granulometric analysis; obtaining a pattern spectrum of the reference image from the granulometric analysis; checking for a similarity between the pattern spectrum and each of the plurality of images; extracting a plurality of candidate images that are similar to the reference image from the plurality of images based on the granulometric analysis; transforming the extracted plurality of candidate images on the basis of the reference image; calculating mutual information shared by each of the plurality of transformed candidate images and the reference image; and selecting a candidate image, which shares a largest amount of mutual information with the reference image, from the plurality of transformed candidate images."

In Applicants' claimed invention, transforming candidate images, calculating mutual information, and selecting a candidate image are all based on the candidate images that are extracted based on the granulometric analysis. As such, Applicants respectfully submit that no combination of Wyman and Ayala describes or suggests an image processing method as described in Claim 1. More specifically, Applicants respectfully submit that no combination of Wyman and Ayala describes or suggests extracting candidate images that are similar to a reference image based on a granulometric analysis that includes adapting images, obtaining a pattern spectrum, and checking for a similarity between the pattern spectrum and a plurality of images. Rather, Wyman merely describes receiving and comparing two image sets to determine or measure how closely the image sets are aligned, and Ayala merely describes

5

that granulometry and granulometric size distributions may be used to define probability distributions for binary and gray-scale images.

Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Wyman in view of Ayala.

Claims 3 and 4 depend from independent Claim 1. When the recitations of Claims 3 and 4 are considered in combination with the recitations of Claim 1, Applicants submit that Claims 3 and 4 likewise are patentable over Wyman in view of Ayala.

Claim 5 recites an image processing apparatus comprising: "an adapting device configured to adapt a reference image and a plurality of images for a granulometric analysis; an obtaining device configured to obtain a pattern spectrum of the reference image from the granulometric analysis; a checking device configured to check for a similarity between the pattern spectrum and each of the plurality of images; an extracting device configured to extract a plurality of candidate images that are similar to the reference image from among the plurality of images based on the granulometric analysis; a transforming device configured to transform the plurality of extracted candidate images on the basis of the reference image; a calculating device configured to calculate mutual information shared by each of the plurality of transformed candidate images and the reference image; and a selecting device configured to select a candidate image, which shares a largest amount of mutual information with the reference image, from among the plurality of transformed candidate images."

In Applicants' claimed invention, transforming candidate images, calculating mutual information, and selecting a candidate image are all based on the candidate images that are extracted based on the granulometric analysis. As such, Applicants respectfully submit that no combination of Wyman and Ayala describes or suggests an image processing apparatus as described in Claim 5. More specifically, Applicants respectfully submit that no combination of Wyman and Ayala describes or suggests extracting candidate images that are similar to a reference image based on a granulometric analysis that includes adapting images, obtaining a pattern spectrum, and checking for a similarity between the pattern spectrum and a plurality of images. Rather, Wyman merely describes receiving and comparing two image sets to determine or measure how closely the image sets are aligned, and Ayala merely describes that granulometry and granulometric size distributions may be used to define probability distributions for binary and gray-scale images.

Accordingly, for at least the reasons set forth above, Claim 5 is submitted to be patentable over Wyman in view of Ayala.

Claims 7 and 8 depend from independent Claim 5. When the recitations of Claims 7 and 8 are considered in combination with the recitations of Claim 5, Applicants submit that Claims 7 and 8 likewise are patentable over Wyman in view of Ayala.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 1, 3-5, 7, and 8 be withdrawn.

The rejection of Claims 2 and 6 under 35 U.S.C. § 103(a) as being unpatentable over Wyman in view of Ayala, and further in view of U.S. Patent 5,623,560 to Nakajima (hereinafter referred to as "Nakajima"), is respectfully traversed.

Wyman and Ayala are described above.

Nakajima describes a method for adjusting positions of radiation images. A first phosphor sheet (5) and a second phosphor sheet (7) are stacked with a filter (6) intervening therebetween. An object (4) is irradiated to generate first and second X-ray images on respective phosphor sheets (5 and 7). Phosphor sheets (5 and 7) are placed one after the other at a predetermined position in an X-ray image read-out apparatus (10). An amount of emitted light (22) represented on first phosphor sheet (5) is converted to a first electric signal (SO1), and a second electrical signal (SO2) is similarly generated from second phosphor sheet (7). Electric signals (SO1 and SO2) are used to transform coordinates in the first X-ray image with affine transformation. The affine transformation simultaneously carries out enlargement or reduction, rotation, and/or parallel translation of the first X-ray image. As such, the first X-ray image is superimposed on the second X-ray image. Notably, Nakajima does not describe or suggest adapting a reference image and a plurality of images for a granulometric analysis. Moreover, Nakajima does not describe or suggest obtaining a pattern spectrum of the reference image from the granulometric analysis or checking for a similarity between the pattern spectrum and each of the plurality of images. Further, Nakajima does not describe or suggest extracting a plurality of candidate images that are similar to the reference image from the plurality of images based on the granulometric analysis.

Claim 2 depends from Claim 1, which is recited above.

In Applicants' claimed invention, transforming candidate images, calculating mutual information, and selecting a candidate image are all based on the candidate images that are extracted based on the granulometric analysis. As such, Applicants respectfully submit that no combination of Wyman, Ayala, and Nakajima describes or suggests an image processing method as described in Claim 1. More specifically, Applicants respectfully submit that no combination of Wyman, Ayala, and Nakajima describes or suggests extracting candidate images that are similar to a reference image based on a granulometric analysis that includes adapting images, obtaining a pattern spectrum, and checking for a similarity between the pattern spectrum and a plurality of images. Rather, Wyman merely describes receiving and comparing two image sets to determine or measure how closely the image sets are aligned, Ayala merely describes that granulometry and granulometric size distributions may be used to define probability distributions for binary and gray-scale images, and Nakajima merely describes an affine transformation that simultaneously carries out enlargement or reduction, rotation, and/or parallel translation of an X-ray image.

Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Wyman in view of Ayala, and further in view of Nakajima.

Claim 2 depends from independent Claim 1. When the recitations of Claim 2 are considered in combination with the recitations of Claim 1, Applicants submit that Claim 2 likewise is patentable over Wyman in view of Ayala, and further in view of Nakajima.

Claim 6 depends from Claim 5, which is recited above.

In Applicants' claimed invention, transforming candidate images, calculating mutual information, and selecting a candidate image are all based on the candidate images that are extracted based on the granulometric analysis. As such, Applicants respectfully submit that no combination of Wyman, Ayala, and Nakajima describes or suggests an image processing apparatus as described in Claim 5. More specifically, Applicants respectfully submit that no combination of Wyman, Ayala, and Nakajima describes or suggests extracting candidate images that are similar to a reference image based on a granulometric analysis that includes adapting images, obtaining a pattern spectrum, and checking for a similarity between the pattern spectrum and a plurality of images. Rather, Wyman merely describes receiving and comparing two image sets to determine or measure how closely the image sets are aligned, Ayala merely describes that granulometry and granulometric size distributions may be used

to define probability distributions for binary and gray-scale images, and Nakajima merely describes an affine transformation that simultaneously carries out enlargement or reduction, rotation, and/or parallel translation of an X-ray image.
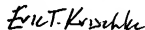
Accordingly, for at least the reasons set forth above, Claim 5 is submitted to be patentable over Wyman in view of Ayala, and further in view of Nakajima.

Claim 6 depends from independent Claim 5. When the recitations of Claim 6 are considered in combination with the recitations of Claim 5, Applicants submit that Claim 6 likewise is patentable over Wyman in view of Ayala, and further in view of Nakajima.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 2 and 6 be withdrawn.

In view of the foregoing amendment and remarks, all the claims that are now active in this application are believed to be in condition for allowance. Reconsideration and favorable action are respectfully solicited.

Respectfully submitted,

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